

Identification Of The Sea Base Of Aceh Island Using Fishfinder Computer With Echo Sounder System

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Abstract

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This study will identify the seabed using a Fishfinder computer with an Echo Sounder System, by taking the output data from the tool. The GARMIN Fishfinder 160 Blue is one of the best echo sounders out there today. This tool is a simple echo sounder, this tool can only measure water depth in one ping. A good system is a system that can identify the profile of the seabed. Therefore, a tool that can work optimally is made to display the profile of the seabed by utilizing the results of measurements of seabed depth per ping. This GARMIN Fishfinder 160 Blue can display the contours of the seabed, but this tool works based on a Microcontroller and is displayed on an LCD (Liquid Crystal Display). Indonesia is known as an archipelagic country which is also known as a maritime or maritime country. Indonesia's marine area reaches 5.8 million km². This sea area is equal to about 70% of the total area of Indonesia. This means that Indonesia's sea area is larger than its land area. The results of the tests carried out are software that is built from the results of the design as expected in terms of accuracy and describes the depth point, so that it can form a seabed profile with the scale made. From the results of testing the Echo Sounder tool (GARMIN Fishfinder 160 Blue) at rest, the measurement error is relatively very small, below 5%. This means that this tool can still be used for research purposes. During software testing, there was a delay (delay) in displaying the basic in situ profile, compared to the GARMIN Fishfinder 160 Blue. Data retrieval of water depth when moving past 4 (four) points has the same value of water depth at 4 (four) points which have been previously measured using Hyperterminal..

Keywords: Determination of quality of coffee beans, website, Weighted Product

1. Introduction

Indonesia is known as an archipelagic country which is also known as a maritime or maritime country. Indonesia's marine area reaches 5.8 million km². This sea area is equal to about 70% of the total area of Indonesia. This means that Indonesia's sea area is larger than its land area.

In the marine world, techniques to identify the exact and accurate depth of the seabed are very necessary. The echo sounder is a device that is often used in measuring the depth of the ocean. Echo sounding is a technique for measuring the depth of water by emitting regular pulses from the surface of the water and then the echo that comes from the seabed is heard again.

This technique has been used since the early 19th century to provide water depth information which is essential for drawing maps of areas covered by the world's waters. These maps have helped ships to sail through the world's oceans safely.

By 1958 most water depth sensing was using single-beam echo sounders. This equipment performs a single measurement of water depth on each pulse transmission acoustically (ping) using a wide beam transducer and a narrow beam. Equipment that produces an acoustic signal with a wide (unstabilized) beam detects echoes with a large solid angle. This is useful for detecting the possibility of danger in the voyage of a ship.

The purpose of Unstabilized is that the width of the beam angle will affect the wavelength, so the larger the beam angle formed, the greater the possibility of missing data. The solid angle itself means the beam direction at a certain depth limit where the data to be generated is still solid. However, this equipment is not able to provide more detailed information about the seabed.

Equipment that generates an acoustic signal with a “stabilized” Narrow-Beam is capable of producing high spatial resolution with a small solid angle, with the survey area covered by the beam of the instrument's acoustic signal limited to each ping. both systems are not able to produce a method for making detailed seabed maps so as to reduce ship sailing time and thus become cost-effective. An unstable system, although capable of covering a wider survey area, does not have sufficient spatial resolution.

While a stable system, although it produces a higher spatial resolution, maps an area that is too small for each ping. In 1964 SeaBeam Instruments, formerly the Harris Anti Submarine Warfare Division of the General Instrument Corporation patented a technique of “multiple narrow-beam depths sounding” [1]. The first system to use this technique was built by SeaBeam for the US Navy and is known as Sonar Array Sounding Systems (SASS). SASS is built on two separate sonar arrays facing orthogonal to each other, one for transmitting and the other for receiving.

The connected sonar and analog electronics form a beam angle between the transmitter and receiver of up to 90° with a step shift of 10 “wide unstabilized beams”. Roll and pitch compensation system (compensation caused by surface waves) is capable of forming a beam angle between transmitter and receiver of up to 60° with a step shift of 10 “wide stabilized beams”, This can map a “fan” which has an angle of 60° at the base sea for each ping. This system allows research vessels to produce high-resolution, wide-area coverage of the ocean floor in much less time than using a single-beam echo sounder (reducing costs for ocean floor mapping).

The GARMIN Fishfinder 160 Blue is one of the best echo sounders out there today. This tool is a simple echo sounder, this tool can only measure water depth in one ping.

A good system is a system that is able to identify the profile of the seabed. Therefore, a tool that is able to work optimally is made to display the profile of the seabed by utilizing the results of measurements of seabed depth per ping.

This GARMIN Fishfinder 160 Blue can display the contours of the seabed, but this tool works based on a Microcontroller and is displayed on the LCD (Liquid Crystal Display).

This study will identify the seabed using a Fishfinder computer with an Echo Sounder System, by taking the output data from the tool.

2. Method

Before the computer performs a write or read operation, the computer must be connected to the device. The function of fopen (obj) is to establish a connection of a serial port object to the device . If the object has been connected to the device then this will happen:

- a) Data that remains in the input buffer is flushed.
- b) The ownership status of the serial port object is open.

Example:

fopen (s) (make a connection between the device and the computer serial port) The issues involved in making a connection on the serial port are:

1. COM = COM 1

2. BaudRate = 4800 kbps
3. DataBits = 8
- 2.1. Reading Data From Device
Before data can be read from the device, the object must be connected using the fopen function. A connected serial port object has an open state value.
Example: fscanf(s) (read measurement results from device)
- 2.2. Disconnect (Disconnect)
Disconnect a serial port object from the device. If a serial port object has been successfully disconnected, then the status property is configured to closed.
Example: fclose(s) (disconnects the connection between the Device and the computer's serial port)
- 2.3. Algorithm for main program
Initialization : s = serial('COM1','BaudRate',4800,'DataBits',8); Looping (for one ping) establishes a connection between the Device and the computer's serial port;
data1 = reading the result of data measurement to 1;
data2 = reading the measurement results of the 2nd data;
data3 = reading the result of the 3rd data measurement;
data4 = reading the result of the 4th data measurement;
disconnect between Device and computer serial port;
input data counter = input data counter + 1;
comma data 2 = find a string "," (comma) in data 2 ;
CommaKe1Data2 = first comma in data 2;
CommaKe2Data2 = 2nd comma in data 2;
Comma data 3 = find a string "," (comma) in data 3;
CommaKe1Data3 = first comma in data 3;
CommaKe2Data3 = 2nd comma in data 3;
Value = CommaKe2Data2 - CommaKe1Data2;
if value = 1
depth = 0;
show depth on windows water_depth;
elseif value not = 1
depth = number of strings between (1st comma Data2 +1) to (2nd comma Data2 -1);
show depth on windows water_depth;
end
counter(count_data_input) = count_data_input;
count rot = counter rotated 90o ;
sliding count = count_rot inverted (inverted);
data (count data input) = depth;
axis x plot = shear count;
axis y plot = data;
plot (axis x plot, axis y plot) on depth graph windows;
temperature = data 3 between (1st comma Data3 +1) to (2nd comma Data2 -1);
display temperature in windows water_temperature;
rest 0.05 seconds to give the programming language time to process;
end loop;
- 2.4. Algorithm for storing data
save data = create a file in the form of text with the name DepthData.txt;
number = number of input count_data_;

data save = the amount of data from the y-axis plot;

motion data = [number of ') ' data save];

print (motion data in save data);

2.5. Algorithm for changing depth scale on windows

20 meter depth range:

Windows depth_graph with y coordinates: from bottom right to left in 100 fixels ; x: from top right to bottom 0 to 20 meters;

30 meter depth range:

Windows depth_graph with y coordinates: from bottom right to left in 100 fixels ; x: from top right to bottom 0 to 30 meters;

40 meters depth range:

Windows depth_graph with y coordinates: from bottom right to left in 100 fixels ; x: from top right to bottom 0 to 40 meters;

50 meters depth range:

Windows depth_graph with y coordinates: from bottom right to left in 100 fixels ; x: from top right to bottom 0 to 50 meters;

60 meters depth range:

Windows depth_graph with y coordinates: from bottom right to left in 100 fixels ; x: from top right to bottom 0 to 60 meters;

70 meters depth range:

Windows depth_graph with y coordinates: from bottom right to left in 100 fixels ; x: from top right to bottom 0 to 70 meters;

100 meters depth range:

Windows depth_graph with y coordinates: from bottom right to left in 100 fixels ; x: from top right to bottom 0 to 100 meters;

150 meters depth range:

Windows depth_graph with y coordinates: from bottom right to left in 100 fixels ; x: from top right to bottom 0 to 150 meters;

200 meters depth range:

Windows depth_graph with y coordinates: from bottom right to left in 100 fixels ; x: from top right to bottom 0 to 200 meters;

300 meters depth range:

Windows depth_graph with y coordinates: from bottom right to left in 100 fixels ; x: from top right to bottom 0 to 300 meters;

600 meters depth range:

Windows depth_graph with y coordinates: from bottom right to left in 100 fixels ; x: from top right to bottom 0 to 600 meters;

3. Results and Discussion

3.1 Position System Testing

Data collection for stationary positions was carried out in the sub-district of the island of Aceh, Aceh Besar district, Aceh province and we took a sample measurement of a depth of 20 meters. Broadly speaking, the working principle of the sending system is to take water depth data from the bottom to the surface of the water using the Garmin Fishfinder 160 Blue. Before taking data with Garmin Fishfinder 160 Blue, measurements were carried out manually using a rope attached to a pendulum and put into the water. Then the water depth measurement is carried out using the Garmin Fishfinder 160 Blue as below:

- a. When the transducer is positioned at a depth of 20 cm below the water surface (vertical offset), the results are obtained as shown in Figure 1.

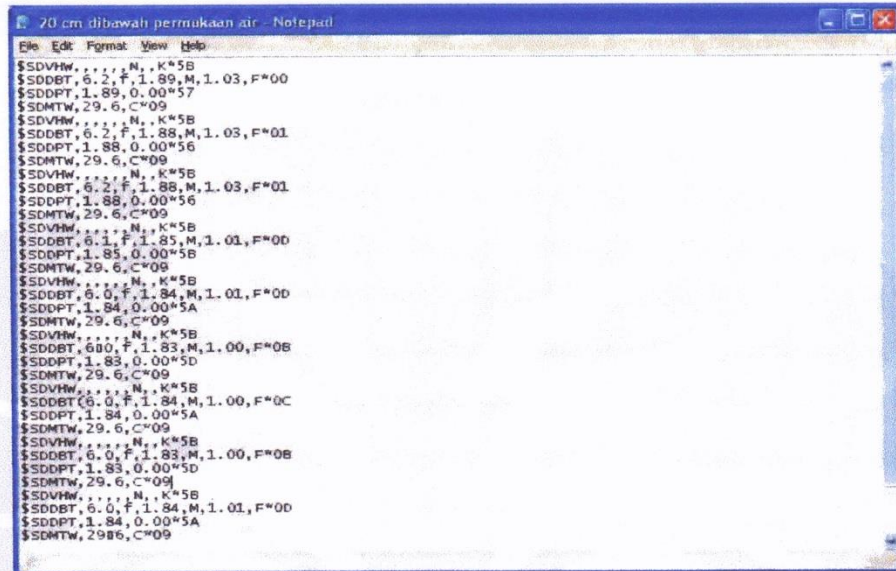


Figure 1. Water depth capture data using Fishfinder 160 Blue at a vertical offset of 20 cm below the water surface

From the data above, it is processed as the table below:

Manual Metering - Echo Sounder Metering

$$\text{Error} = \frac{\text{Manual Measurement} - \text{Measurement With Echo Sounder (Meters)}}{\text{Manual Measurement}} \times 100 \%$$

c Manual Measurement

Table 1. Table of results for measuring the depth of the offset 20 cm below the water surface

No	Vertical Offset (cm)	Manual Measurement (meters)	Measurement With Echo Sounder (Meters)	Error (%)
1	20	1,9	1,89	0,53
2	20	1,9	1,88	1,05
3	20	1,9	1,88	1,05
4	20	1,9	1,85	2,63
5	20	1,9	1,84	3,16
6	20	1,9	1,83	3,68
7	20	1,9	1,84	3,16
8	20	1,9	1,83	3,68
9	20	1,9	1,84	3,16
10	20	1,9	1,83	3,68
Rata-rata			1,85	2,58

The measurement results are shown in table 1 with a depth measurement of 20 cm below the water surface. The data obtained in 10 pings is relatively constant. The average error between manually measured

data and using Garmin Fishfinder 160 blue is around 4.35%, this value is of course still considered a very small error to be able to continue further research using Garmin Fishfinder 160 blue.

Based on the data obtained from table 1 there is a relatively small error or error this is due to the rise and fall of the water surface by the influence of waves around the test area. For the development of more detailed research using Fishfinder 160 blue, a detailed depth calculation can be carried out using the Medwin Formula.

$$V = 1449.2 + (4.6 * T) - (0.055 * T * T) + (0.00029 * T * T * T) + ((1.34 - (0.01 * T)) * (S - 35) + (0.016 * D))$$

Where :

V = Velocity of Sound in the Water

T = Water temperatur (C)

S = Salinity (ppm)

D = Water Depth (m)

In data collection, more accurate information is needed from the parameters above (T and S) because an error of 0.07 m/s in the sound velocity will cause a difference in Water Depth of 0.5 m. (Source medwin formula error type cause by T and S error). To get the value of T and S using a tool in the form of TS - Dip or CTD Velocity Propile Probe.

4. Conclusions

- The software built from the design results is as expected in terms of accuracy and describes the depth point so that it can form a seabed profile with the scale made.
- From the test results of the Echo Sounder (GARMIN Fishfinder 160 Blue) at rest, the measurement error is relatively very small, below 5%. This means that this tool can still be used for research purposes.
- During software testing there was a delay (delay) in displaying the basic profile of the site, compared to the GARMIN Fishfinder 160 Blue. This is due to 2 possibilities, namely:
 - The performance of the computer used is too low
 - The data retrieval process by this programming language is slow.
- Data retrieval of water depth when moving past 4 (four) points has the same value of water depth at 4 (four) points that have previously been measured using Hyperterminal.

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